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(54) LCD television projector with lamp aging compensation

(57) Known LCD projectors, used for example in TV sets, can only be manually adjusted for the compensation of the changing color spectrum of the lamp due to its aging process.

An LCD projector according to the invention further comprises an image sensor 8 to measure the light intensity of the lamp 1. In a color adjusting circuit the image color is compensated as a function of the measured signal by controlling 6 the LCD valve 4.

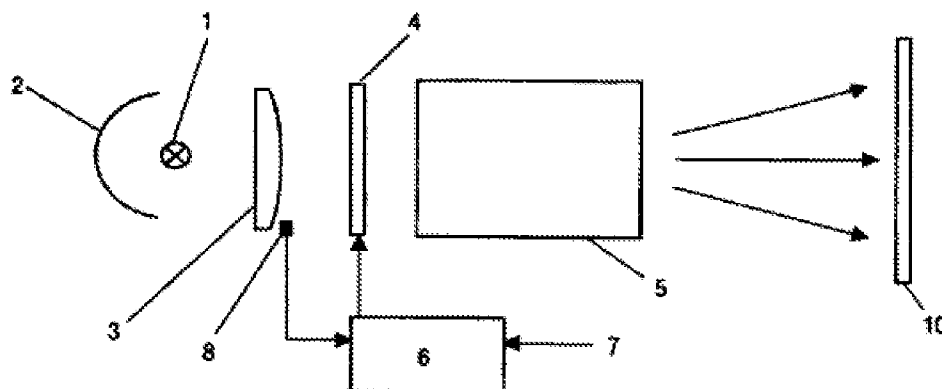


Fig.1

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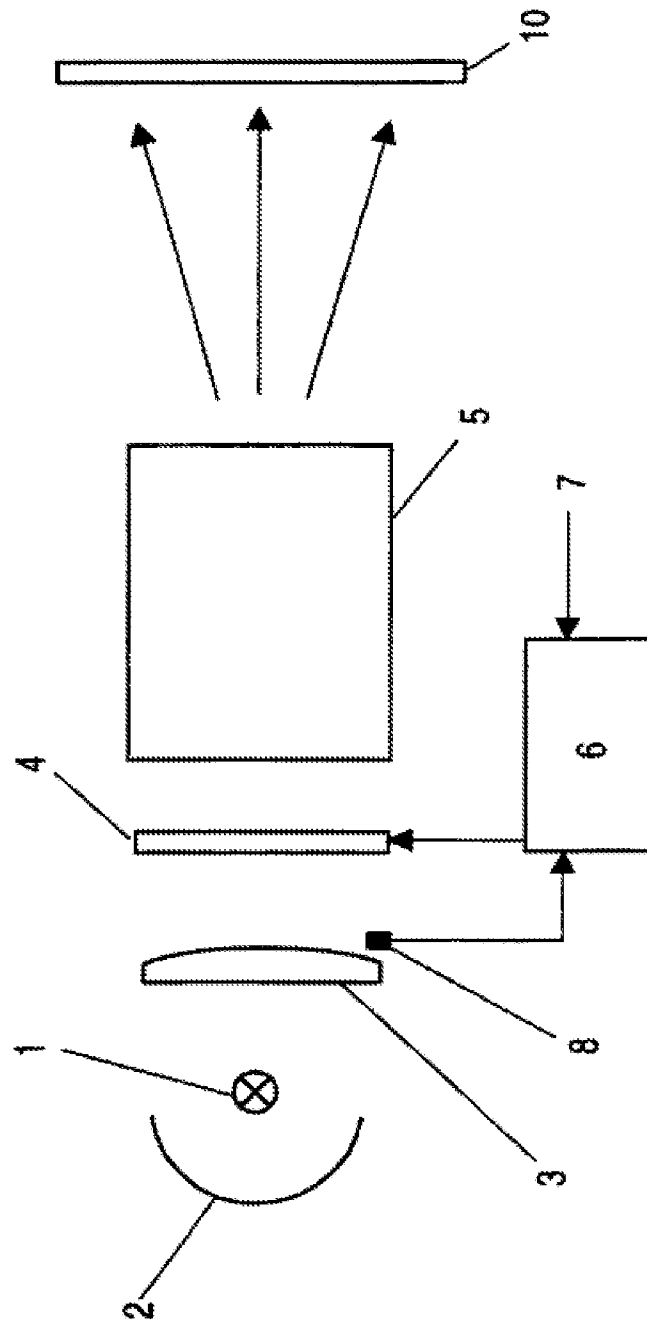


Fig.1

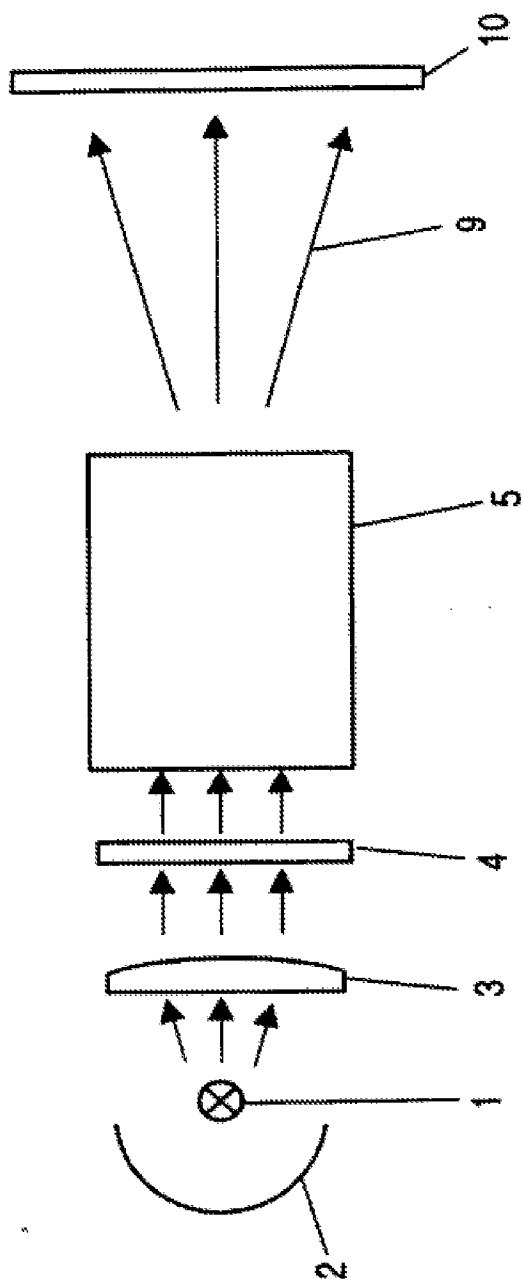


Fig.2
Prior Art

LCD Projector

The present invention relates to a LCD projector according to the preamble of claim 1.

LCD projectors, for example when used as a TV set, are known and can be realized by a projector system having a lamp, light valves, optics and a screen. The light valves are realized, for example, by a LCD valve as in the "Sharp TFT LCD projector XV-P3". The light valve, ie, the LCD valve, includes a transparent means, where the transparency can be controlled as a function of the light intensity to be displayed by the projector. Further, the light of the lamp is characterized by the luminance and also by its color spectrum. This color spectrum depends on the luminance or the intensity of the light. Said luminance may change with the life time or operating time of the lamp. This in turn means that after a certain period of time, light luminance and therefore light color spectrum changes, which results in different image colors of the TV set. Today's projectors therefore have a manual adjustment function to change the image color by a user. But usually the user does not want to adjust the LCD projector of his TV set each time when he uses said TV set.

It is therefore an object of the invention to keep automatically a certain picture color independent of the luminance of the projector lamp.

This object is solved by the subject matter of claim 1. The dependent claims are subject of a preferred embodiment.

The present invention relates to a LCD projector with an illumination means, a collimating means and a controllable LCD valve, wherein the LCD projector further comprises a sensor for sensing the light intensity and a color adjustment circuit for controlling the LCD valve based on the signals of said sensor. Usually, the collimating means of the LCD projector are formed by a collimator lens and the LCD projector comprises projection lenses to project the image onto a screen.

Further the light sensor of the LCD projector according to the invention is located between the collimating means and the LCD valve. But it is also possible to locate the light sensor of the LCD projector between the illumination means and the collimator means. The illumination means of the LCD projector may comprise a lamp and a reflector.

The invention has the advantage that different light can be compensated automatically so that the picture color is always within a given range. Thereby a projector is realized, which is more convenient for a user. As the variation of light color with light intensity is compensated, brightness can be adjusted by varying the light intensity without influence on the image color. In this way power can be saved compared to known brightness controls. Further, the LCD projector is cost effective, because it only uses one light sensor.

A preferred embodiment of the invention is described with reference to the accompanying drawings, wherein:

Fig. 1 shows a schematic of a LCD projector according to the invention, and

Fig. 2 shows a LCD projector according to the state of the art.

Fig. 1 shows an LCD projector, used for example in TV sets, wherein a lamp 1 with a reflector 2 generates light incident upon a collimator lens 3. The parallel light after the collimator lens passes a LCD valve 4 which controls the light intensity in a pixelwise manner. Then the light controlled by the LCD valve 4 passes through projection lenses 5 so that an image is generated on a screen 10. The LCD valve 4 is controlled by a color adjustment circuit 6, wherein an image signal 7 is input. Because the image color is a function of the light intensity delivered from the lamp 1, the light intensity is measured by a light sensor 8. The signal of the light sensor 8 is input to the color adjustment circuit 6 which adjusts the image color according to the kind of lamp 1 (light color of the lamp) and adjusts the image color as a function of the delivered light intensity. It is

further possible to combine the function "color adjustment circuit" with a hue or tint circuit of a known projector.

Further the sensor can be arranged between the lamp 1 and the collimator lens 3 instead of the arrangement between the collimator lens 3 and the LCD valve 4 as given in Fig. 1.

It may be mentioned that the LCD valve 4 is shown only schematically. It can be realised e.g. as a color LCD panel or as three monochrome LCD panels for RED, GREEN, BLUE.

Fig. 2 shows a known LCD projector comprising a lamp 1 with a reflector 2, a collimator lens 3 followed by a LCD valve 4 used as light valves and projector lenses 5 to project an image onto a screen 10. The path of a light ray 9 between the projection lenses 5 and the screen 10 is shown schematically. In the known LCD projector the light intensity is adjusted manually (not shown).

Claims

1. LCD projector with an illumination means (1, 2), a collimating means (3) and a controllable LCD valve (4),
characterized in that
the LCD projector further comprises a sensor (8) for sensing the light intensity and a color adjustment circuit (6) for controlling the LCD valve (4) based on the signals of said sensor (8).
2. LCD projector according to claim 1, wherein the light sensor (8) is located between the collimating means (3) and the LCD valve (4).
3. LCD projector according to claim 1, wherein the light sensor (8) is located between the illumination means (1, 2) and the collimator means (3).
4. LCD projector according to one of the preceding claims, further comprising projection lenses (5).
5. LCD projector according to one of the preceding claims, wherein the collimating means (3) are formed by a collimator lens (3).
6. LCD projector according to one of the preceding claims, wherein the illumination means (1, 2) comprises a lamp (1) and a reflector (2).



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Claims searched: 1-6

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Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4F FCW

Int Cl (Ed.6): H04N 5/74,9/31,5/57,5/52

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2237400 A (EEV) see whole doc	1
A	EP 0453030 A1 (PHILIPS) see col 1 lines 21-24	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.